

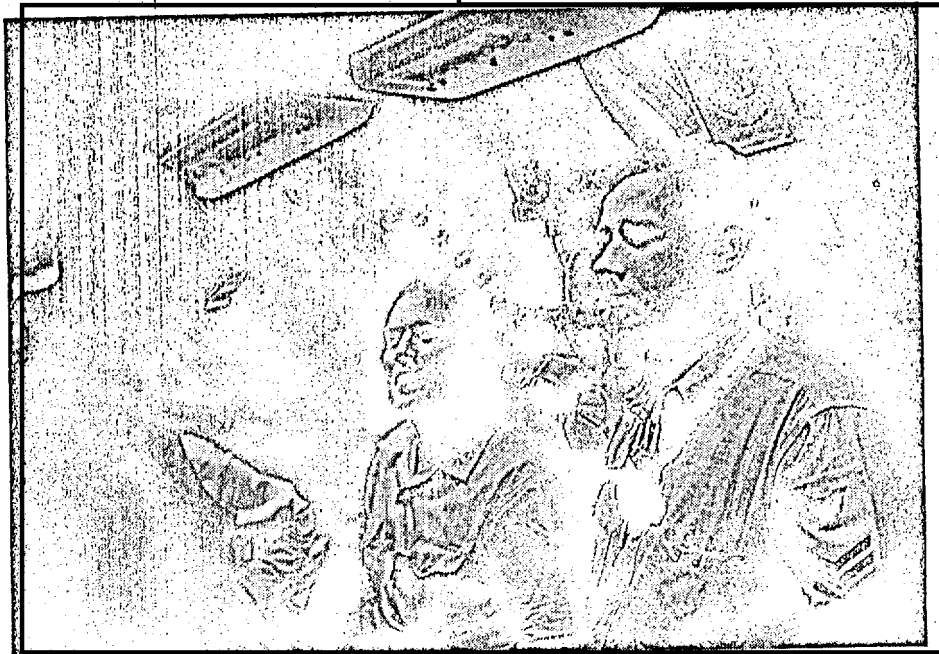
DEFENSE

Power for Peace

Suddenly the blue-green Gulf Stream erupted with convulsive fury. Like a giant marlin in a cascade of brine, a grey, bottle-shaped monster leaped into the afternoon. For an instant it hung against the sky—silent, ominous, streaming foam. Then it came alive with unearthly racket. Its tail belched flame, and it climbed into its new element with incredible ease. Arcing high into the thin, cold reaches of space, the first ballistic missile ever to be fired from a submerged submarine swung surely toward the south and east. Polaris, named for the mariner's bright pole star, needed no such guidance now. Brief seconds after it breached the water off Cape

Devastating Deterrent. In those two 15-minute flights, Polaris gave firm promise that the U.S. is ready to move into a new age of security and deterrence with a revolutionary weapons system. The nuclear subs that are its launching platforms can roam the world's oceans at will, difficult to detect and destroy, ready to deliver their lethal birds on targets 1,200 miles away with an accuracy within a mile. One sub alone packs 16 missiles, and each shipload of missiles packs the explosive punch of all the bombs expended by both sides in World War II (including the A-bombs dropped on Hiroshima and Nagasaki).

Polaris qualifies as the ideal deterrent: an all but invulnerable striking force capable of surviving a sneak attack—a



POLARIS BOSS RABORN (CENTER) ABOARD "GEORGE WASHINGTON"
"From out of the deep to target. Perfect."

U.S. Navy

Canaveral last week and screamed down the Atlantic missile range, it was on its own—and it was on target.

Some 40 ft. below the roiling water, a grinning redhead, wearing the two stars of a rear admiral, thrust his way through the crowded companionway of the Fleet Ballistic Missile Submarine *George Washington* and clapped her skipper, Commander James Osborn, on the back. Then, just to prove it was all routine, Rear Admiral William Raborn Jr., boss of the Navy's Polaris project, gave orders to get ready for a second shot before a proud succinct message was sent to President Eisenhower in Newport: "Polaris, from out of the deep to target. Perfect." In a second message to Admiral Arleigh Burke, chief of naval operations, Red Raborn let go all the pent-up exuberation of a classic achievement: "This new star of peace hoisted a trail of missile smoke from salt water to space as a signal of a bright new addition to seapower, a new strategic use of the world's oceans which and behind the iron and bamboo curtains."

mobile, dispersible, devastating guarantee of destruction to any enemy tempted to touch off an all-out assault. With Polaris submarines at sea, no enemy can possibly figure on knocking out U.S. power with a strike at SAC airfields and missile bases. In the long pull of cold war, Polaris will relax pressures on overseas allies, some uneasy at the provocative presence of U.S. missile sites. Polaris itself is listed as an intermediate range missile, but Polaris-plus-submarine bids to be perhaps the most effective intercontinental missile of all. Both *George Washington*, which fired last week's test, and her sister ship *Patrick Henry* will be on duty by year's end, and with just these first two missile submarines on station—each with 16 missiles—the U.S. will outnumber the Soviets in known numbers of ICBMs and go a long way toward bridging any missile gap. They will open a new sea frontier along the 6,000-mile stretch of Indian Ocean where the U.S. now has no bases. They will be at home along the long Arctic coastline of a fleet of 45 FBM submarines—30 on station at

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SKIPPER OSBORN BRINGING "GEORGE WASHINGTON" INTO CANAVERAL
The countdown began five years ago.

a time around the Eurasian land mass. And by 1965 Red Raborn plans to extend Polaris' range to 2,500 miles per missile.

Sailing Orders. The countdown that will put Polaris on station in the '60s began in 1955. In a broad survey of U.S. military strength for President Eisenhower, a blue-ribbon committee chaired by (then) Massachusetts Institute of Technology President James R. Killian Jr. recommended the construction of a fleet ballistic missile to be fired from a submarine. It was a suggestion that set up as complex a problem as ever faced the combined talents of U.S. science and technology. It called for a missile that could live in water, the earth's atmosphere, space and the re-entry zone. It demanded a method for handling dangerous fuels and explosives in a confined shipboard environment. Launching problems—tough enough on land—would be infinitely complicated at sea. The ship would need a navigation system of exquisite accuracy if it was to fire its birds on target, and the birds themselves would need a guidance system more precise than any then in production. Even more jarring to conservative Navy men, this was not a conventional, all-purpose Navy weapon. It was an out-and-out city killer; it seemed out of place in a naval tradition preoccupied with keeping the sea lanes free.

The Navy did not hesitate, nor did it follow the example of other services and call in civilian industry to run its program. Chief of Naval Operations Burke issued orders to Rear Admiral William Francis Raborn Jr., 55, a bluff, barrel-chested navigator who had never seen the sea before he got to Annapolis with the class of 1928. Burke gave Raborn orders to proceed with "all possible haste" to develop a fleet ballistic missile. He was authorized to set up a task force called, simply, Special Projects, which would cut across all the Navy's cherished bureaus. His work, Raborn was told, would get "Brickbat Zero One" priority; there was (and is) none higher. Target date: 1965.

Along with his orders, Red Raborn got a letter, a blunt, forceful document which was a rarity in the annals of the Navy, signed by the CNO himself. "If Rear Admiral Raborn runs into any difficulty with which I can help," wrote Admiral Burke, "I will want to know about it at once, along with his recommended course of action . . . If more money is needed, we will get it. If he needs more people, those people will be ordered in. If there is anything that slows this project up beyond the capacity of the Navy and the department, we will immediately take it to the highest level and not work our way up through several days."

Burke also added some final, verbal instructions: "Red, there are chop points to this program. Any time it looks as though you're batting your head against a technological wall—if you see the job isn't technically feasible—it will be cut off dead."

Ready to Die. With his flushed, sea-dog face, his poop-deck voice, his blunt, peppery language, Red Raborn scarcely seemed the type to tackle a job that called for a trained scientist. More important, Raborn was a driving organizer, a demon for efficiency and an able politician. He had done time in almost every branch of his service—aviation, destroyers, gunnery schools—and everywhere he was known as a man with a single-minded urge to get things done. At Pearl Harbor in 1941, his patrol squadron was one of the few loaded with bombs and ready to fight back against the Japanese. He was executive officer of the aircraft carrier *Hancock* when she was blasted by a Japanese kamikaze, won the Silver Star for getting fires under control and repairing the flight deck in time to recover aircraft. As skipper of the carrier *Bennington* in 1954, he took over damage control when a catapult exploded and killed 103 men (and earned a Bronze Star).

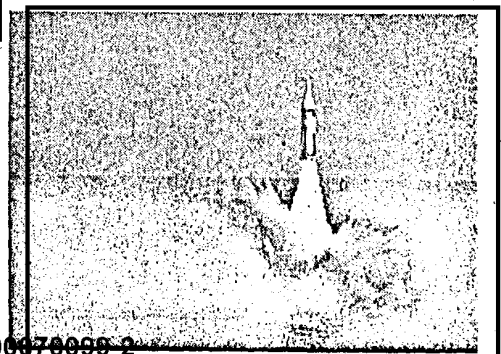
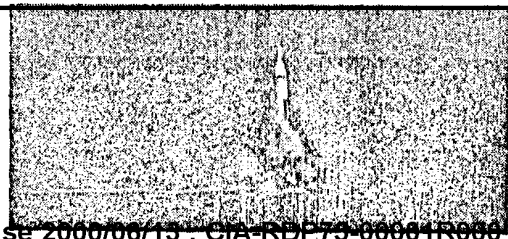
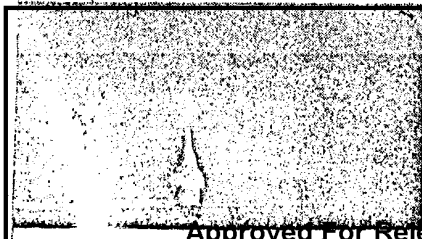
In his first weeks in the Polaris program, he demonstrated a massive capacity for work and a monumental scorn for the little details that might slow him down. He had no time for shuffling papers through in and out boxes. He kept a clean desk, stuffed all incoming mail in a small drawer and remarked: "When I can't close the drawer, someone around here isn't doing enough work." As he recruited people into the Special Projects group, Red gave them all—including their families—a patriotic pep talk on the importance of their mission. Whenever anyone seemed to be soldiering on the job, he was hauled before the admiral for "re-dedicating." Remembering one of those emotional sessions, one S.P. officer says: "When I walked out, I knew I was ready to die for someone, but I didn't know—or remember—whether it was the admiral, the President, my mother, the head of the Boy Scouts, or who. But, brother, I was ready to die."

Men & Money. At first Raborn tried to make some use of the Army's liquid-fueled Jupiter missile. He was soon convinced that dangerous, liquid fuels sloshing around on shipboard would never

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A NEW STRATEGIC CONCEPT LEAPED INTO THE AFTERNOON



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prove practical. And when breakthroughs in the arcane art of missilery satisfied him that a sea-borne solid-fueled bird could be built, he argued that the Navy should set out on its own—that it should start on Polaris.

Despite all objections, the Navy and the Defense Department decided on the expensive gamble. Red Raborn found himself in command of a program that demanded more of U.S. science and technology than any military program had ever demanded before. His submarine was yet to be built; its navigation system was still in the planning stage. His missile had neither its guidance system, its rockets nor the solution to its launching problems. "But I had all the tools I needed," he recalls. "I had authority, and I had money."

Increased Pressure. Early in the game Raborn concluded that the management techniques of U.S. industry were not good enough for him; businessmen, he told his civilian assistant Gordon Pehrson, know figures, but they do not know what goes on in their plants. Raborn's management experts soon set up a system called PERT (Program Evaluation Research Task) that provided the boss with graphically charted records and computer-calculated time estimates for every milestone on his schedule. Threading his way through a maze of PERT charts, Raborn could spot trouble in advance—at Sunnyvale, Calif., where Lockheed Aircraft Corp., prime contractors for the missile kept 9,000 men on the job, at the new plant near Sacramento where Aerojet-General Corp. was working on solid-fuel rocket engines, at the Groton, Conn. sub pens of the Electric Boat Division of General Dynamics Corp. From weekly progress reports he could tell where to pour on extra effort to break a prospective bottleneck. Contractors had a hard time keeping up with Raborn's knowledge of what was going on in their own plants. "Red," says Lockheed's top Polaris man Stan Burris, "is the most unreasonable man if you come to him about a problem you've got today. Tell him about a problem you're going to have in six months, and you've got the most patient and understanding guy you've ever met."

The pressure never let up—and then, suddenly, it increased. In August 1957 the Soviets fired their first ICBM, and the

oceans narrowed from thousands of miles to 30 minutes. The continental U.S. came within reach of a distant enemy firing from his own shore. On Oct. 4 that same year, Sputnik I soared into orbit. Official Washington, once it got over the shock, set about finding effective ways to respond to the increased Russian capabilities.

Wartime Urgency. The Navy's Special Projects group was asked what it could accomplish with a supplemental \$350 million. Can-Do Man Raborn took just a week of consultation with ship design and missile experts to produce an answer. If the Defense Department would settle for a 1,200-mile missile instead of the 1,500-miler that was in the works, he could give the fleet an operational system by 1960, a full five years earlier than planned.

At the Electric Boat's Groton yard, a nuclear-attack sub of the *Skipjack* class was well along in construction. Her reactor and control-room sections were nearly completed. By chopping that 250-ft. vessel in half and inserting a 130-ft. missile bay in her midriff, she could be commissioned in two years as a Polaris submarine. But though he knew his scheme was technically possible, Raborn still had to convince himself that U.S. industry would work as hard as his new schedule required.

At Raborn's request, the top men from all his important contractors—Lockheed, G.E., General Dynamics, M.I.T.—were summoned to a meeting in Washington. In a speech that was part locker-room pep talk, part sermon, part Navy enlistment appeal, part Arthur Godfrey commercial, they were asked if they were willing to proceed on "wartime urgency with wartime dedication." If the answer was yes, said Raborn, "I want the word of your company in bond that you will do the job."

The silence in the room when he was finished, remembers Raborn, "was like the silence after a talk by an evangelist. It was the silence before you heard the shuffle on the sawdust." Lockheed Vice President L. E. Root turned to his boss, Bob Gross, and whispered something, the sibilants resounding across the quiet room.

When Root was finished, Bob Gross walked to the blackboard and wrote "Lockheed." General Electric's Ralph Cor-diner stood up and said: "Give us the money and stay out of our hair." Everyone else simply nodded. The next day a Marine courier arrived at the Special Projects office in the old Munitions Building and delivered top-secret orders to proceed with the Polaris acceleration.

Frágant Memory. Raborn got his program moving at flank speed. Somehow, in record time, every phase of the mission had to be worked out in theory and tested in practice. Dummy birds of everything from redwood to cement were fired at installations from San Clemente Island to Cape Canaveral. There were test shots from a converted Mariner-class ship, *Observation Island*. There were tethered shots, shots that were grabbed by hooks, and buoyant birds netted in the water. All helped give basic information.

The missile's propellant was painstakingly perfected as the chemistry of high-energy fuels was tested at half a dozen laboratories. At one point, Raborn's talent scouts had to track down an expatriate German, descendant of a long line of armor makers, who could work the heat-resistant beryllium parts for the missile's control vanes. They found him in Ohio, in a backyard auto garage.

At Electric Boat, three shifts worked around the clock, and the grim hulls bulged steadily into shape. All the while, their complicated, crowded quarters were worked over and improved. Because crews had to last out months at sea, there would be none of the stench of diesel fuel and battery acid that fouled the air of early submarines. Into *George Washington* and *Patrick Henry* went 300-ton ca-

pacities, air-conditioning equipment, air

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scrubbers and precipitants to remove irritants, and oxygen generators to enable the subs to manufacture their own habitable environment. Bunks were designed for comfort, no-lint skivvies procured to keep the air filters clear; wide-screen movie equipment and exercise gear were installed. These Polaris subs were to be no "pig boats" of fragrant Navy memory.

Article of War. Pound for pound, as the ships* grew and their equipment was installed, they became the most complex vehicles ever built for the sea. And by the time *George Washington* was ready for launching last December (just as the PERT charts predicted), the men who had been chosen to manage her fantastic hardware were as impressive as the ship herself. Commander James Butler Osborn, the crew-cut, square-jawed skipper who looks like a football player, talks like a

* Until the outsize Polaris came along the Navy had traditionally classified subs as boats. Polaris subs are the first to escape the traditional fish names, are named for U.S. heroes on the suggestion of an ex-Army general named Eisenhower.

Marine drill sergeant and thinks like a well-trained engineer. Secreted in his love with his exquisite command. "This ship," he insisted, "is not a problem in physics; it's an article of war."

As an article of war, her men learned to hide her under water layers where sharp changes of temperature would foul enemy sonar; they practiced with the Navy's new, very low-frequency radio gear with which they could receive messages from 6,000 miles away without resurfacing. They became adept at using Polaris' SINS (Ships Inertial Navigation System), the mare's nest of gyros and electronic equipment that locates *George Washington* on a precise spot on the globe so that she can dial infinitely accurate directions into her missiles. There were star-tracking periscopes and radiometric sextants for checking on the SINS; there was secret optical alignment gear for checking on the missiles in their 16 silos; there was rack on rack of fire-control computers—and mastery meant constant schooling, constant practice.

When the time came for the real test Polaris and her crew were ready. The SINS had the ship exactly on station. The control surfaces that could whip *George Washington* through the water like a startled eel now held it steady and motionless. On signal, the muzzle door atop a missile tube swung open. A small explosive charge ruptured the plastic membrane that protected the bird from sea water, and a great blast of compressed air sent it rocketing toward the surface and its remarkable flight.

This was the payoff on the bold gamble that committed \$3.5 billions of the national defense budget before a single shot was fired. It was the first installment on the Polaris fleet that will run up a bill as large as the entire budget for the Strategic Air Command. But it was a cold war bargain. "It is not nearly so expensive," says Red Raborn proudly, "as a weapon that would not be pre-eminent in war. The second-best weapon is the one that costs too much." Last week there were few to argue that Polaris was second best.

